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EXAMINER

SHEVIN, MARK L

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/533,607	<b>Applicant(s)</b> ISHIKAWA ET AL.	
	<b>Examiner</b> Mark L. Shevin	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2008 and 20 October 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/10/2008</u>  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Status of Claims***

1. Claims 1-3 and 5, filed October 20<sup>th</sup>, 2008 are pending.

### ***Acknowledgement of RCE***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 20<sup>th</sup>, 2008 has been entered.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted November 10<sup>th</sup>, 2008 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner. Please refer to applicants' copy of the 1449 form submitted herewith.

### ***Status of Previous Rejections***

4. The previous rejection of claims 1-5 under 35 U.S.C. 103(a) in the Office action dated April 17<sup>th</sup>, 2008 over Statnikov (US 6,338,765) have been withdrawn in view of the amendments to claims 1, 2, and 5 and the cancellation of claim 4.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections - 35 USC § 103***

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5. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Statnikov** (US 6,338,765) in view of **IIW** (S. Statnikov, Guide for Application of Ultrasonic Impact Treatment Improving Fatigue Life of Welded Structures, IIW/IIS – Document XIII-1757-99, *International Institute of Welding*, 1999, p. 1-29.).

Regarding claims 1 and 2, Statnikov teaches a method of treating welded steel bodies by pulse impact ultrasonic energy (Abstract). Statnikov teaches that his invention introduces pulse wave energy into a metal body's interior structure in such magnitude as to improve the grain structure and the residual stress patterns (column 5, lines 52-62). The effect of this ultrasonic impact treatment on internal microstructure is again recognized in column 6, lines 59 to 67 and column 8, lines 1-20. Statnikov teaches that this ultrasonic impact treatment method is particularly suited to treating welded joints (column 10, lines 17-24). Furthermore, in reference to steels, Statnikov teaches that the ultrasonic impact technique (UIT) "creates a rearrangement submicrostructure of grains in treated areas, particularly in ferromagnetic materials." (column 10, lines 45-57). See also claims 11-13, 34, and 36.

Statnikov does not explicitly teach the application of his ultrasonic vibration tool specifically to heat affected zones formed by "a last pass of a multi-layer welded joint" (claim 1) or a "fillet welded joint" (claim 2) nor does he teach the specifics of the microstructure asserted after the phrase "to thereby make" in claims 1 and 2.

Statnikov teaches the single, main positive step recited as "a method", which is subjecting a surface of a heat affected zone...to impacts by an ultrasonic vibration tool. As Statnikov teaches the one positive, physical step, in the method of claims 1 and 2,

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the effects on crystal structure and undercut length must necessarily flow from this action. The Examiner assumes that Statnikov effects microstructure and undercut length (implicitly a defect mentioned in the Abstract, "a void") as it features the same positive step as the instant claim 1. Both Statnikov and the instant claim have the same basic step of subjecting a welded area to ultrasonic impacts and are thus functional equivalents.

Statnikov further teaches that the use of an indenter tool with one or more needles (pins) for carrying out the ultrasonic impact treatment process (col. 6, lines 1-20). Statnikov discloses (col. 19, lines 45-60) the amplitude of pins is approximately 25-40 microns (mkm is read as microns given the earlier disclosure of microns as the y-axis of the graph of Figure 9).

Statnikov, does not however, teach the diameter of the one or more pins in the indenter tool.

IIW, authored by the same Statnikov of US 6,388,765, discloses on page 7 that the indenter diameter is about 2-5 mm and has an amplitude of from 25-40 microns. Furthermore, IIW teaches (p. 15) that the tooling should ensure access for indenters to the weld toe and thus suggests that the diameter of the indenters is a result effective variable in the access to the weld toe to be treated depending on the size of the weld toe to be treated.

While Statnikov might not teach treatment of the particular type of weld mentioned in claims 1 and 2, it would be readily obvious to one of ordinary skill in the metallurgical arts to modify Statnikov to apply the disclosed method of ultrasonic impact

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treatment to any type of metal weld joint including fillet and multi-layer weld joints. Applying a known technique (ultrasonic impact treatment) to a different type of weld is within the ability of one of ordinary skill in the art and one would have a reasonable expectation of success in improving a given material property such as toughness.

The text following “a method of...” (in both claims 1 and 2) is not given patentably weight as it is intended use that does not specifically limit the structure of the work product produced by the positive step, ultrasonic impacts. Substituting the word “toughness” with “fatigue” (or simply broadening the claim to “improving the mechanical properties”) would in no way change the structure indicated.

Regarding the amendment to claim 1 adding "using one or more pins having a diameter of 5 to 30 mm with an oscillating amplitude of between 20 to 60 microns", both Statnikov and IIW disclose amplitudes in the claimed range and IIW discloses a range of pin diameters that overlaps the claimed range of 5-30 mm. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: “In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists.”

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Regarding claim 3, these claims are rejected for the same reasons as claims 1 and 2 in that Statnikov teaches the same positive process step. The prior art performs the same process on the same material, steel, and it is assumed to produce the same results. Discovery of a new property, such as alteration of crystal structure, does not confer patentability. Statnikov and others (see additional relevant art) had been operating on the assumption that improvement in toughness or fatigue was based on residual stresses and strains rather than crystal structure, a claim to a known method of treating welds to form a given microstructure is obvious.

Regarding claim 5, Statnikov teaches that thermal tempering (supplemental heating above and beyond initial welding) is a known process effective for relaxing residual stress and for internally restructuring crystal structure in terms of grain size (column 1, lines 51-54). It would have been obvious to modify Statnikov to implement a supplemental heating step before, during, or even after ultrasonic treatment as Statnikov teaches that this process relieves stresses. Furthermore, applying a known technique to new product is well within the reach of one of ordinary skill in the art and as such, one would have a reasonable expectation of success in heating a welded area (heat affected zone) at any time, before or during treatment.

***Response to Applicant's Arguments:***

6. Applicant's arguments filed October 20<sup>th</sup>, 2008 have been fully considered but they are not persuasive.

Applicants assert (p. 4, para 2-4) that Statnikov does not have a description of a more concrete depth and thus a person skilled in the art could not easily conceive the

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characteristic feature of the present invention of the average of longitudinal axis of crystal grains at a depth of at least 2 mm from the surface of the steel plate...

In response, '765 uses ultrasonic impact treatment to improve the grain structure and the residual stress patterns in the welded material (col. 5, lines 52-62) with the explicit objective being "to produce longer wear and increased load bearing capacity." The grain structure is modified as explained again at col. 6, lines 59-67. The internal microstructure of the product is reworked to relax and redistribute residual structural stress patterns caused by welding in the vicinity of weld seams (col. 8, lines 1-20). It is clear then that '765 is having a profound beneficial effect on the mechanical properties of the welded parts that are treated by the method of the patent and this is a result of change in microstructure. From MPEP 2112, para. V, subpara 1: "[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on 'inherency' under 35 U.S.C. 102, on '*prima facie* obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same..."

Applicants assert (p. 5, para 2) that the claimed indenter diameter is quite different from that of the UIT process of Statnikov as disclosed in the IIW document XII-1757-1999.

In response, both indenters overlap at the 5 mm mark and the IIW documents suggests that the indenter size is driven by access to the weld toe and thus one of ordinary skill would be motivated to optimize the indenter diameter to suit the needs of the weld areas to be treated.



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Applicants assert (p. 6, para 1-2) that the UIT process of Statnikov cannot be easily applied to steel plate for improving toughness.

In response, Applicants have not shown that Statnikov is ineffective or unable to improve the toughness of a steel plate. Furthermore, the improvement of toughness mentioned in the preamble is an intended use as it does not impart any additional structural limitations to the process or steel plate produced.

Applicants assert (p. 6, para 3) that it is well known that there is no relationship between toughness and fatigue strength.

In response, the Examiner has asserted that the same voids that reduce toughness also reduce fatigue strength as these voids or defects (such as cracks in the weld toe region) raise the stress concentration coefficient. Both toughness and fatigue are diminished by the presence of voids, cracks, and particularly surface defects that serve as geometric stress risers. Indeed one of the basic tests of toughness relies on a large pre-machined 'V'-shaped notch in the material to serve as a crack initiation point. As the UIT technique of '765 teaches the removal of voids and repair of cracked surfaces (col. 10, lines 20-40) one would thus have a reasonable expectation of success in that such a method of closing cracks and generating compressive stresses that close cracks and prevents crack formation and propagation would increase toughness. Thus there is indeed a relationship between toughness and fatigue.

### ***Conclusion***

**-- Claims 1-3 and 5 are rejected**

**-- No claims are allowed**

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The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

***/Mark L. Shevin/***  
Examiner, Art Unit 1793

*/Roy King/*  
Supervisory Patent Examiner, Art Unit 1793

January 4th, 2008  
10-533,607